

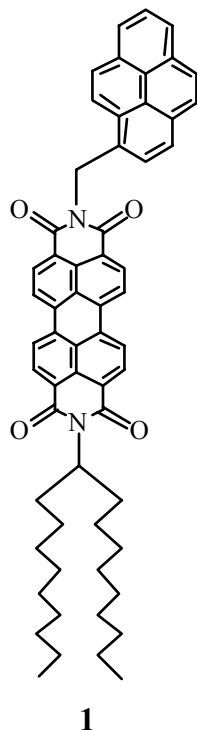
Synthesis and Evaluation of Perylenebisimide-Derived Donor-Sigma-Acceptor Molecules as Electrical Rectifiers



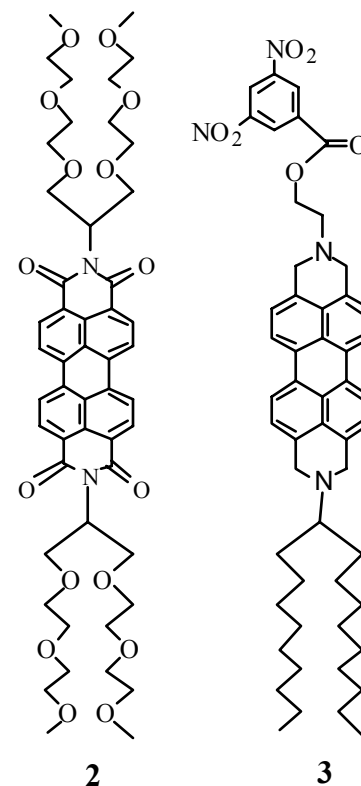
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Research Accomplishments



- A monolayer of the **donor-sigma-acceptor molecule 1**, with a pyrene donor, a perylenebisimide acceptor, and a C19 swallowtail, has been **shown to rectify current** with a modest rectification ratio. This adds to the small roster of molecular rectifiers.
- We have prepared a perylenebisimide with two **polyethylene-glycol swallowtails, 2**. As opposed to typical perylenebis-imides (which are notoriously insoluble) and alkyl swallowtailed perylenebisimides (which are soluble in nonpolar solvents), **2** possesses **remarkable solubility in water and alcohols**. We plan to use this feature of PEG swallowtails to control monolayer orientation.
- We have reversed the polarity of the perylenebisimide core by reducing away the carbonyls to make it a donor, and constructed the **reverse-polarity acceptor-sigma-donor-swallowtail molecule 3** with a dinitrobenzoyl acceptor. This molecule will be tested for reverse rectification.



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Broader Accomplishments

- We have been able to provide work-study support for a dedicated undergraduate student, a top student in organic chemistry who is planning a career in medicinal chemistry.